


CASE REPORT

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# MR imaging features of uterine necrosis following modified B-Lynch sutures: a case report

Shruti Thakur<sup>1\*</sup> , Anupam Jhobta<sup>1</sup>, Mukesh Surya<sup>1</sup> and Ashwani Tomar<sup>1</sup>

## Abstract

**Background** B-Lynch braided compression sutures are applied as a lifesaving procedure to control atonic post-partum hemorrhage if the patient is not responding to uterotonics and other conservative methods. These sutures are applied to avoid hysterectomy so as to preserve fertility. However, if not applied properly, these can lead to a rare but serious complication of uterine necrosis secondary to uterine ischemia and sepsis. The patient then ends up in hysterectomy defeating the sole purpose of maintaining fertility for which the sutures were applied at the first place.

**Case presentation** Here we describe a case of primipara who had caesarian section complicated by post-partum hemorrhage which was managed with modified B-Lynch compression sutures for achieving hemostasis. The patient presented three weeks post-procedure with signs and symptoms of inflammation and sepsis. The MR imaging revealed features of uterine necrosis. The patient underwent hysterectomy unwillingly as no other option was left to save her life. A detailed MR imaging of this case has been described given the scarcity of MR features of uterine necrosis following compressive sutures in medical literature.

**Conclusions** The case is reported to make the clinicians aware of the possibility of such a dreaded complication following compressive sutures for post-partum hemorrhage and to emphasize on early and timely follow-up of such patients so that uterus could be salvaged.

**Keywords** Post-partum hemorrhage, Modified B-Lynch compressive sutures, MRI, Uterine necrosis, Fertility

## Background

Post-partum hemorrhage (PPH) is the most common cause of maternal mortality worldwide with atonic uterus being the most frequent factor attributing to PPH [1]. The management of PPH should be as conservative as possible for saving future fertility. It consists of medical therapy in the form of uterotonics like oxytocin, methergine, prostaglandins and tranexamic acid [2]. If the

medical management fails various conservative procedures like uterine bimanual massage, balloon tamponade, compression sutures, transcatheter arterial embolization and uterine artery or internal iliac artery ligation could be done [3]. The final treatment is obstetric hysterectomy if the PPH is still intractable which takes away from the female the basic right to conceive. So, to avoid hysterectomy, various compression sutures are performed with their own pros and cons. Uterine necrosis is a fearsome, albeit rare complication of such compression sutures with a sparse literature on its MRI features.

\*Correspondence:

Shruti Thakur

tshruti878@yahoo.in

<sup>1</sup> Department of Radiodiagnosis, Indira Gandhi Medical College and Hospital (IGMC), Shimla, HP 171001, India

## Case presentation

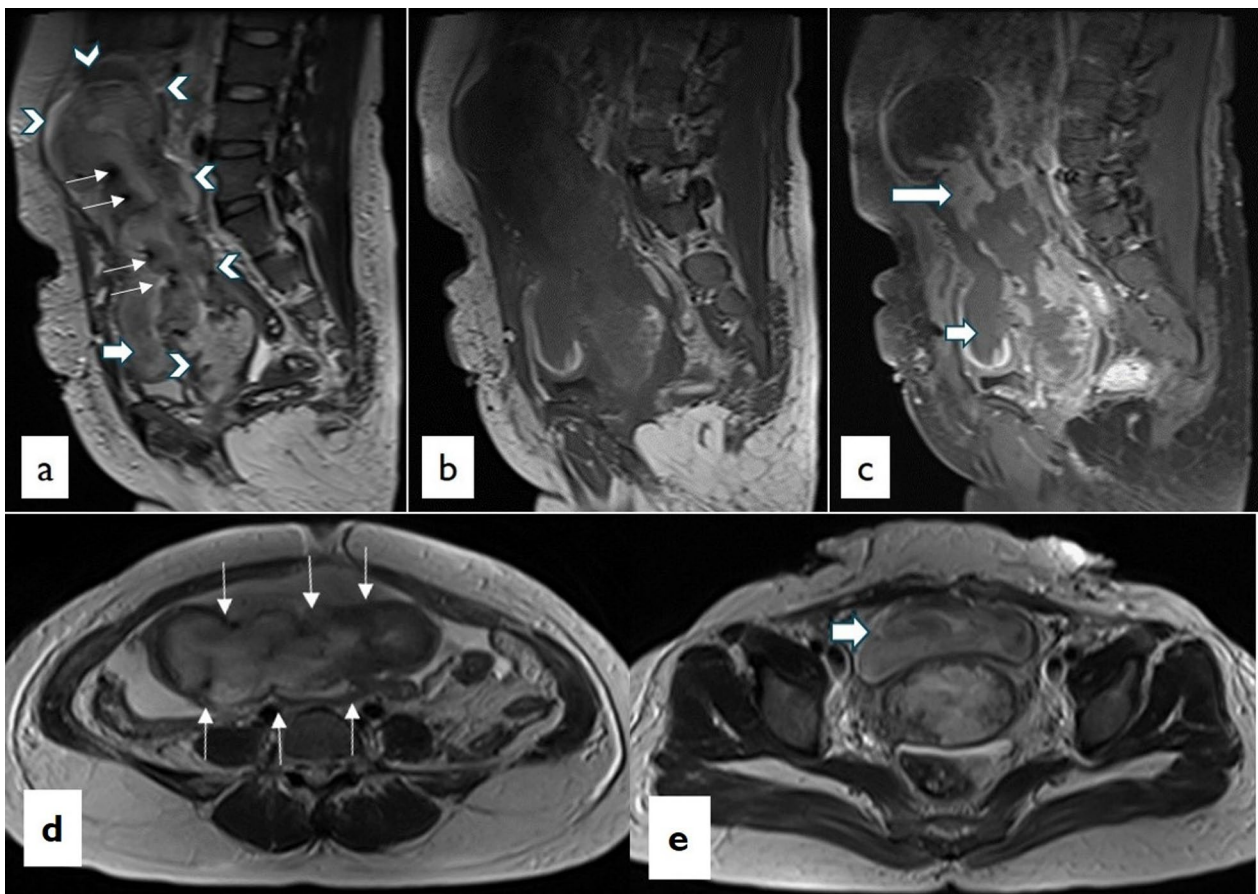
A 28-year-old primipara came to our emergency department with complaints of fever, abdominal distention, pelvic tenderness and foul-smelling discharge per vaginum for one week. These complaints had increased in severity for the past couple of days. The patient had undergone an emergency lower segment caesarian section at full term for fetal distress three weeks back. However, the surgery was complicated by intractable post-partum hemorrhage (PPH) for which various medical treatments were tried but failed. She was primipara and had not completed her family, so to prevent obstetric hysterectomy and to conserve the fertility, modified B-Lynch braided absorbable compression sutures were applied without uterine or internal iliac artery ligation which stopped the bleeding. The immediate post-operative period was uneventful and the patient was discharged from the hospital after five days. After two weeks of hospital discharge, she presented with the above-mentioned symptoms. Her blood investigations showed low hemoglobin level (7.6 gm%), increased total leucocyte count ( $19,000 \times 10^6/L$ ) and neutrophil percentage (86%) and a raised C-reactive protein (8 mg/dL), indicating inflammation and sepsis. Rest of the routine blood investigations were within normal limits. Abdominal ultrasound which was done on GE LOGIQ P6 263780509 machine showed non-involved heterogeneous uterus with dirty shadowing and indiscernible endometrium and myometrium. Keeping in view the operative history of the patient and raised inflammatory markers, a possibility of post-partum sepsis was kept. The patient underwent an MRI (Siemens Magnetom Avanto) for exact anatomical and pathological delineation that showed enlarged non-involved uterus and multiple fluid collections within and anterior to the uterus on T1 and T2 sequences. Gross non-enhancing uterine myometrium was seen in post-contrast fat sat T1 sequence suggestive of uterine necrosis. Multiple transversely oriented grooves were also seen on uterine corpus secondary to suture lines of modified B-Lynch sutures (Fig. 1a–e). The patient had to undergo hysterectomy because the uterus was not salvable at this point of time and served as a source of infection which could have endangered patient's life. The case is reported to highlight that if a patient undergoes such a procedure, she should be advised early and frequent follow-ups so that such an unwanted complication with dismal outcome could be managed appropriately. It also raises a concern for perfection of surgical skills, and such compressive suturing techniques should be added in the training curriculum during residency.

## Discussion

Post-partum hemorrhage (PPH) is considered an obstetric emergency and one of the leading causes of maternal mortality. It is defined as cumulative blood loss of greater than 1000 ml with signs and symptoms of hypovolemia within 24 h of birth process, regardless of the route of delivery [2]. PPH is called primary if the bleeding is within first 24 h of delivery and secondary if the bleeding occurs between 24 h of delivery to 12 weeks post-partum [4]. The most common cause of PPH is atonic uterus; others being trauma to genital tract, coagulation abnormalities and retained products of conception or blood clots. The management of PPH is crucial in which the time is limited and the stakes are high. The available treatments to achieve hemostasis range from medical therapy including oxytocin, ergometrine, prostaglandins and recently added tranexamic acid to conservative uterus sparing procedures like fundal uterine massage, bimanual uterine compression, balloon tamponade, radiological uterine artery embolization and compression sutures so as to conserve uterus and maintain the chance of likely pregnancy [3]. Obstetric hysterectomy is the last resort if all other maneuvers fail jeopardizing any further scope for pregnancy.

The first compression suture technique for PPH was used by B-Lynch et al. in 1997 [4]. It is widely accepted because of its simplicity and effectiveness. Since then, various modifications of the technique have been devised like Cho-Square compression sutures, Hayman technique, Pereira compressive sutures, Ouahba technique and Hackethan technique as an effective fertility preserving methods [3, 5]. The choice of most perfect compressive sutures should be individualized depending upon the site and cause of uterine bleeding and upon the expertise of the surgeon [6]. A success rate of 91.7% has been reported for various compression sutures to control PPH [7] and 86.4% success rate in avoiding obstetric hysterectomies [8]. However, they have their own benefits and drawbacks. The complications encountered with these sutures are pyometra, hematometra, sepsis, uterine adhesions, Asherman's syndrome, infertility and rarely uterine necrosis [9].

Modified B-Lynch suturing technique adds transverse sutures to the vertical sutures of conventional B-Lynch sutures. It opposes the anterior and posterior uterine walls to each other thereby completely obliterating the endometrial cavity and compressing all the uterine venous channels to achieve hemostasis and prevents immediate hysterectomy. This technique does not stop the blood supply to the uterus like in stepwise uterus devascularization or vessel ligation and is unlikely to cause uterine necrosis [5]. The suture tension is critical to the success of the technique. The sutures should be tight



**Fig. 1** A 28-year-old primipara with uterine necrosis following modified B-Lynch braided compression sutures applied for post-partum hemorrhage. **a** Sagittal T2-weighted image shows non-involuted uterus (arrowheads) with multiple transversely oriented grooves in uterine corpus (thin arrows) and a fluid collection (thick short arrow) anterior to the uterus and superior to the urinary bladder. **b** Sagittal T1-weighted image shows abnormal uterine morphology almost non-discernible from the fluid collections within the uterus and in the surrounding tissue. **c** Sagittal post-contrast image shows scattered areas of viable enhancing myometrium (thick long arrow) showing marked thinning at places and breach anteriorly through which the intrauterine fluid collection/pus is communicating with the fluid collection anterior to the uterus (thick short arrow). Multiple non-enhancing areas are seen within the uterus suggestive of severe myometrial necrosis. **d** Axial T2-weighted image shows multiple constrictions/grooves in uterine corpus (thin arrows) and **e** fluid collection anterior to the uterus (thick short arrow)

enough to completely obliterate the endometrial cavity; otherwise, it acts as a potential space where fluid collections like pyometra and hematometra develop. But if not done appropriately, that is, if the sutures are too tight, the transversely running uterine arcuate arteries are compressed, markedly reducing uterine blood supply leading to ischemia and subsequent necrosis. The transverse sutures near the cervix occlude the uterine cavity outlet, hindering passage of post-delivery uterine secretions and blood which distend the uterine cavity, further increasing the intrauterine pressure and adding to the uterine ischemia. The retained secretions also serve as a nidus for the superimposed infections expediting the necrotic process in the already compromised uterus. The complications also depend upon the types of sutures used. If the

sutures are absorbable, they cannot be applied too tight as these are weak and amenable to break. If the sutures are non-absorbable or delayed absorbable, they can be applied overtight and risk of ischemia and necrosis is increased. However, post-partum uterus involutes with daily decrease in its dimensions. So, the compressive sutures loosen after 24 h and the possibility of ischemic necrosis is not high [5]. The risk of necrosis increases if the compressive suture technique is combined with vessel ligation procedure or uterine artery embolization.

In scenario of development of such a post-procedural complication, the blood investigations may show low hemoglobin and raised inflammatory markers. The first-line imaging modality is ultrasound that may reveal sub-involuted uterus with heterogeneous echotexture, loss

of normal uterine ultrasonic anatomy, fluid collections and dirty shadowing suggestive of air within the uterus. However, for comprehensive imaging, MRI is must as it delineates the pelvic anatomy very well. On MRI, the uterus is enlarged as compared to its normal postpartum size indicating subinvolution and shows multiple transverse grooves on its body and extensive folding of uterine wall produced by the compressive force of the sutures. The T2-weighted images show loss of normal zonal anatomy of the uterus along with distension of uterine cavity with fluid secondary to retained uterine secretions or tissue necrosis. The myometrium is thinned out and may show breach in its continuity and areas of non-enhancement in post-contrast images indicating its non-viability. Abscesses may be seen within the uterus and in the surrounding tissue that show restricted diffusion on DWI images.

Uterine compression sutures have undoubtedly preserved future fertility in many patients. B-Lynch sutures technique is widely accepted because it is easy to learn, can be used in low-resource setup and there is no risk of injury to ureter or major blood vessels. But the complications which may accompany this technique should be actively looked for. If such complications are detected early, patient can be taken for exploratory laparotomy and the overtight sutures can be loosened or released along with evacuation of retained uterine fluid so as to prevent further uterine ischemia. It will give a chance to avoid hysterectomy and to save patient's fertile potential. However, the data on the efficacy and safety of this technique are lacking. In the longer term, conservation of fertility is also controversial because of lack of long-term follow-up research. So, its complications should be kept in mind before adopting this technique for routine use to manage PPH.

## Conclusions

All the post-partum cases who have undergone compression suturing for PPH require an early follow-up as these techniques are not without complications and not entirely safe. Prompt imaging is invaluable in detecting such unwanted post-operative sequelae that end up in hysterectomies, so that timely measures could be taken to salvage uterus if possible.

## Abbreviations

PPH	Post-partum hemorrhage
MRI	Magnetic resonance imaging
DWI	Diffusion weighted imaging

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None.

## Author contributions

Dr Shruti Thakur helped in study concept and design. Dr. Mukesh Surya acquired the data. Dr. Shruti Thakur analyzed the data. Dr Shruti Thakur and Dr.

Ashwani Tomar drafted the manuscript. Dr. Anupam Jhobta critically revised the manuscript.

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## Availability of data and materials

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## Declarations

### Ethics approval and consent to participate

Written informed consent was taken from the patient.

### Consent for publication

Written informed consent was taken from the patient.

### Competing interests

The authors declare that they have no competing interests.

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## References

- Jain S, Somalwar SA, Joshi SA, Bhalerao AV, Kawthalkar AS, Mahore S (2012) Total uterine necrosis: a complication of B-Lynch suture. *J South Asian Fed Obstet Gynaecol*. 4(1):61
- Escobar MF, Nassar AH, Theron G, Barnea ER, Nicholson W, Ramasauskaite D et al (2022) FIGO recommendations on the management of postpartum hemorrhage 2022. *Int J Gynecol Obst* 157(S1):3–50. <https://doi.org/10.1002/ijgo.14116>
- Matsubara S, Yano H, Ohkuchi A, Kuwata T, Usui R, Suzuki M (2013) Uterine compression sutures for postpartum hemorrhage: an overview. *Acta Obstet Gynecol Scand* 92:378–385
- Punya B, Sailakshmi M, Akash S (2015) Uterine necrosis following B-Lynch and Gunasheela's global stitch sutures for primary postpartum hemorrhage. *J Med Sci* 1(2):38–40
- Nalini N, Kumar A, Prasad MK, Singh AV, Sharma S, Singh B, et al (2022) Obstetric and maternal outcomes after B-Lynch compression sutures: a meta-analysis. *Cureus*
- Shi C, Chen J, Chen A (2023) Clinical outcome analysis of modified B-Lynch sutures in the fundus uteri and part of the corpus uteri for the prevention of intraoperative haemorrhage during caesarean delivery in women with twin pregnancy: a retrospective study. *BMC Pregnancy Childbirth* 23(1):428
- Luo L, Wan J, Chen X, Zhang H, Zhang M, Chen Q (2021) Uterine necrosis, infection, and subinvolution: complications observed after combined application of modified B-Lynch suture and vascular ligation. *J Int Med Res* 49(5):030006052110107–030006052110107
- Mishra A, Dash S, Rath S (2017) B-Lynch resulting in total uterine necrosis leading to obstetric hysterectomy. *J Obstet Gynecol India* 69(S1):4–6
- Dasari P (2022) Conservative management of uterine necrosis following bilateral uterine vessels ligation and B-Lynch suture: Long term follow up. *Indian J Obstet Gynecol Res* 9(3):421–424

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